

tubes to flow through the shroud and into the well annulus during a gravel pack operation and for fluids to flow into the shroud and through the sand screen during production.

[0033] The present methods can be combined with other techniques, such as prepacking, fracturing, chemical consolidation, etc. The methods may be applied at the time of completion or later in the well's life. The unconsolidated formation can be fractured prior to or during the injection of the particulate material into the unconsolidated producing zone, and the particulate material can be deposited in the fractures as well as in the annulus between the sand screen and the wellbore.

[0034] The improved spacing methods and apparatus of this invention provide a simpler, more cost-effective system with multiple paths, so that a slurry can bypass any premature annulus bridges that form during gravel packing or frac packing and halt the packing process. The system may be used in long intervals and variable formations.

[0035] Other and further objects, features and advantages of the present invention will be readily apparent to those skilled in the art upon a reading of the description of preferred embodiments which follows when taken in conjunction with the accompanying drawings, in which:

DESCRIPTION OF THE DRAWINGS

[0036] FIG. 1 is a schematic view illustrating a well screen structure embodying principles of the present invention located in an eccentric position within a horizontal open-hole wellbore adjacent a subterranean zone to be completed;

[0037] FIG. 2 is a cross-sectional view of the configuration of FIG. 1;

[0038] FIG. 3 is a partial sectional view taken along line 3-3 in FIG. 2, looking in the direction of the arrows;

[0039] FIG. 4 is a partial sectional view of one embodiment of a perforated shroud concentrically mounted over a sand screen having alternate flowpaths in accordance with the present invention;

[0040] FIGS. 5A to 5D illustrate shrouds laid flat prior to forming into a cylindrical shape with variations of configurations of blank tubes in accordance with the present invention;

[0041] FIG. 6 is an elevation view, partly in section, of a further embodiment of a well tool having alternate flowpaths in accordance with the present invention;

[0042] FIG. 7 is an elevation view, partly in section, of still another embodiment of a well tool having alternate flowpaths in accordance with the present invention; and

[0043] FIG. 8 is a detail view of an alternative embodiment.

DETAILED DESCRIPTION OF THE INVENTION

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